



# MO Risk-Based Corrective Action for Petroleum Storage Tank Sites - Applicability of Vapor Pathway to Surficial Soil

Hazardous Waste Program technical bulletin

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## What is the vapor pathway?

Under the Missouri Risk-Based Corrective Action (MRBCA) process, the vapor pathway is when volatile chemicals create vapors and migrate through soil or groundwater into an enclosed structure such as a home or business. The vapors enter the structure through cracks or other gaps in the foundation. Vapors are then present in indoor air and can be inhaled by people residing or working in the structure.

## Where do the vapors come from?

Vapors come from petroleum releases to the environment. The releases might occur on the surface, like a gasoline dispenser, or in the subsurface, like a leaking underground storage tank. In either case, the petroleum migrates vertically through the soil to the top of groundwater. Some of the petroleum will absorb to soil particles. Over time, certain chemicals within the absorbed petroleum can volatilize into air within the soil and migrate upward through the soil. Some of the absorbed chemicals will dissolve into rainwater or snow melt. The dissolved chemicals will then migrate vertically to groundwater. Now in groundwater, some of these chemicals will volatilize over time and migrate upward through the soil.

## How are surficial soil and subsurface soil defined in the MRBCA process?

Surficial soil is soil from the surface of the ground to a depth of three feet. Subsurface soil is soil in the zone between a depth of three feet and the top of groundwater.

## Is the vapor pathway applicable to both surficial and subsurface soil?

In some cases, yes. The vapor pathway applies when a structure exists over contaminated soil or groundwater, or when a structure could be built over contamination in the future. If the current or planned structure is built with a slab on grade foundation, the structure will exist over both surficial and subsurface soil. In such cases, the vapor pathway must be evaluated for both surficial and subsurface soil. If the current or planned structure will have a foundation below a depth of three feet, the vapor pathway will not apply to the zone of surficial soil. If someone conducting a MRBCA evaluation cannot definitively predict whether the foundations of future structures will be above or below the surficial soil zone, then the evaluator must assume that the foundation of any structure built on the site might be above the surficial soil zone and the evaluator must therefore apply the vapor pathway analysis to both surficial and subsurface soil.



**If the current or planned structure is built over surficial soil, but the surficial soil is free of petroleum contamination, does the vapor pathway still apply?**

No. The pathway applies to surficial soil only if the surficial soil is contaminated.

**The MRBCA guidance does not include risk-based target levels applicable to the vapor pathway in surficial soil. If the pathway is or could be complete, what target levels apply?**

In cases where the pathway applies to surficial soil, target levels must be developed at Tier 2 of the MRBCA process by changing the depth to subsurface soil source fate and transport parameter (on the Fate and Transport Parameter page of the MRBCA computational software) to a value representing the actual depth of soil contamination (a value necessarily less than the Tier 1 default value of 91.44 cm). The computational software will then calculate a subsurface soil site-specific target level (SSTL) applicable to all soil below this depth. Note that the value will appear under the column for subsurface soil rather than surficial soil.

**If the pathway applies to surficial soil, how do I calculate a representative concentration for surficial soil?**

The representative concentration for surficial soil is calculated much like the representative concentration for subsurface soil is calculated. The only difference is the data used to calculate a representative concentration for surficial soil must come from soil samples collected between the ground surface and a depth of three feet. With that difference, the representative concentration calculation process is the same as for subsurface soil.

For more information call or write:

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